

Application No.: 10/064,830

Docket No.: JCLA9625

In The Specification:

Please amend the paragraph as number in the specification as follows:

[0025] In addition to the cost of supercapacitor related to the commercial viability of the integrated battery of the present invention, the price of the enclosed electronic controller is also a critical factor. FIG. 2 is a preferred embodiment showing a block diagram of an on-board controller 200 for guiding the compensatory actions between battery LI/B 110 and supercapacitor S/C 112. Inside the housing 201, the controller is consisted of a charge sub-controller (C) 205 and a discharge sub-controller (D) 206 for governing energy supplied through diode 204 from an input such as an AC or a DC power source, as well as for governing energy output to loads. When there is no external energy, battery LI/B provides energy with voltage adjustment, for example, 4.2V or lower is stepped up to 5.0V, by the charge sub-controller C through communication bus 202 and 203 to charge supercapacitor S/C. Battery LI/B is pre-set to discharge at no more than 1C. 1C rate means that the allowable energy of batteries is drained in 1 hour. ~~If loads demand powers more than battery LI/B can provide~~ there exists a power difference between a power demanded by a load and that provided by the LI/B, ~~the extra power need will~~ it can be supplemented by supplied a provision of ~~by~~ supercapacitor S/C via the modulation of discharge sub-controller D.

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[0026] Now, the topology of charge sub-controller C and discharge sub-controller D is explained in FIGs. 2A and 2B, respectively. FIG. 2A shows charge sub-controller C consisting of a micro-controller (μ C1) denoted as 217 and three switches, SW1 (219), SW2 (221), and SW3 (223), of MOSFET (metal oxide semiconductor field effect transistor) type encased in the housing 211. During charging, a charging current is supplied by an external power source to point IN, which is regulated by micro-controller 217 through switches 219 and 221 also communication buses 215, 225, and 227 to primarily charge supercapacitor S/C 112 to its nominal cell voltage. Within the forgoing voltage, S/C 112 can accept charging currents of ~~any~~ a magnitude up to hundreds of Ampere. Hence, even as large as the currents generated in the regenerative braking systems of trucks can be conserved and re-used by employing supercapacitor as load leveling for the integrated battery. Once S/C 112 is fully charged and battery LI/B 110 is detected low in energy content, S/C 112 will supply energy under the command of micro-controller 217 via bus 227 and bus 215, switch 223 into bus 213 to charge LI/B 110. A double arrow is included in 223 to indicate a two-way charging between S/C and LI/B. If necessary, the charging sequence will be repeated until both S/C 112 and LI/B 110 are fully charged. By then, the charge sub-controller C will automatically disconnect the integrated battery from the external power source.

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